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Interactive comment on "Organic carbon burial efficiency in a large tropical hydroelectric reservoir" *by* R. Mendonça et al.

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Although most climate maps of Brazil consider the region where the Mascarenhas de Moraes (MSM) reservoir is located as tropical, according to the Köppen climate classification this reservoir is indeed located in a sub-tropical zone. We decided to use this classification and we will therefore adjust the manuscript accordingly. We will inform about it in the "Reservoir description" section and we will replaced "tropical" with "sub-tropical" along the manuscript. The MSM reservoir is large when compared to most other hydroelectric reservoirs in Brazil or in the world. We, however, agree to

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remove the word “large” from the title in order to avoid possible misinterpretations. The new title of the manuscript will be: “Organic carbon burial efficiency in a sub-tropical hydroelectric reservoir”.

We are familiar with the Sikar et al. (2009 and 2012) studies, but these studies had different objectives impeding a direct comparison with our findings. The 2009 paper contains organic carbon (OC) burial rates and a “sink index”, calculated as “the ratio between total daily permanent C sedimentation and the sum of total daily CCH4 emission at each reservoir and above-background downstream emission”. This index is not comparable to our OC burial efficiency data. In a publication from 2012, which includes the OC burial data from Sikar et al. 2009, Sikar et al. calculate OC burial efficiency in the Cerrado reservoirs, including MSM. However, they sampled only one to three sites per reservoir and most of the sites were located in small arms of the reservoirs and close to the shore (coordinates on Table 1, Sikar et al. 2012). For example, only one core per field campaign was taken in MSM, from a site at the end of a small bay without river inflow (i.e probably a site of small sediment accumulation, since most of the sedimentation typically occurs in deeper areas). Such sampling strategy is suitable for means of comparison between methods (e.g. Si versus 210Pb, which was a purpose of the Sikar et al. study), but not for estimates of system-wide OC burial rates. Especially in the case of reservoirs, where sedimentation and sediment characteristics are highly heterogeneous (core-specific OC burial efficiencies varied from 9% to 86% in MSM) a single coring site at the periphery does not represent the system.

We agree that understanding the net effect of hydroelectric reservoirs on greenhouse gas emissions (GHG) is an urgent matter. And we are aware that quantifying the efficiency with which reservoirs bury OC in their sediments as compared to the potential depositional environments in the absence of the dam is crucial for this understanding (Mendonça et al. 2012). It was not the purpose of our current paper, however, to draw conclusions about the net effect of reservoirs on global warming. Neither does our paper deal with atmospheric GHG emissions. Our intention was to bring a robust

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and sound account of the burial efficiency of reservoir sediments, and a balanced discussion of our findings. Our results and our discussion are in no way influenced by representatives of the hydropower industry and we are confident that our results represents an important addition to the current knowledge about the net GHG emissions from hydroelectric reservoirs. We, then, will add the following paragraph to the last sub-section of the Discussion: "The 43% of the deposited OC that is mineralized in the MSM sediments may contribute to the CO2 and CH4 emissions to the atmosphere. Particularly, the share emitted as CH4 represents a potential impact of dams on global warming when compared to the previous fluvial environment. Importantly, this impact cannot be estimated based on our data, which only refer to the carbon balance of the sediment, since CH4 oxidation to CO2 in the water column can play a major role in reservoirs (Guerin and Abril, 2007). However, since part of the OC burial may alleviate emissions, our robust account of OCBE adds important information to the current knowledge about the net GHG emissions from hydroelectric reservoirs."

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